

# Bondstrand™ 2000M/7000M for Marine & Offshore

1 to 6 inch (Quick-lock® joint), 8 to 40 inch (Taper/Taper joint) with external pressure requirements

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## Uses and Applications

- Ballast
- Chlorination
- Drain
- Cargo line
- Sanitary service & sewage
- Portable discharge line
- Stripping lines
- Tank cleaning (salt water)
- Fire protection mains
- Various other applications

A complete library of Bondstrand pipe and fittings in PDS and PDMS-format is available on CD-ROM. Please contact NOV Fiber Glass Systems for details.

For specific fire protection requirements, an outer layer of passive fire protection is available.

For pipe systems without external pressure requirements, please contact your Bondstrand representative.

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## Approvals

In 1993, IMO (International Maritime Organization) issued Resolution A.753 (18) covering acceptance criteria for the use of plastic pipe on ships. Major certifying bodies have adopted and implemented these Guidelines in their respective Rules and Regulations for the Classification of Ships.

All Bondstrand pipe series used in the marine industry are designed and type-approved by the below major certifying bodies. (A complete list is available, on request)

- American Bureau of Shipping (ABS), U.S.A.;
  - Bureau Veritas, France;
  - Det Norske Veritas, Norway;
  - Germanischer Lloyd, Germany;
  - Lloyd's Register, United Kingdom;
  - Nippon Kaiji Kyokai, Japan;
  - Registro Italiano Navale (RINA), Italy;
  - United States Coast Guard (USCG), U.S.A.
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## Characteristics

Maximum operating temperature: up to 93°C. Higher temperature application is available, please consult NOV Fiber Glass Systems.

Pipe diameter: 1 - 40 inch (25-1000 mm).

Pipe system design for pressure ratings up to: 17.2 bar (250 psi) for 1 - 16 inch and 16.0 bar (232 psi) for 18 - 40 inch, depending type of fittings, see contents for each fitting designated pressure rating.

ASTM D-2992 Hydrostatic Design Basis (Procedure B - service factor 0.5);

ASTM D-1599 Safety factor of 4:1. Design criteria for external pressure requirements are in accordance with IMO regulations.

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### **Bondstrand 2000M**

ASTM D-2310 Classification: RTRP-11FX for static hydrostatic design basis. Complies with ASTM F-1173 Classification and ASTM D-2996 designation.

### **Bondstrand 7000M**

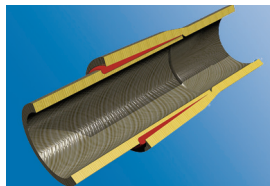
ASTM D-2310 Classification: RTRP-11AX for static hydrostatic design basis. Complies with ASTM F-1173 Classification and ASTM D-2996 designation.

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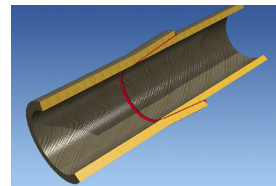
## Joining System

Quick-Lock™ joint  
1-6 inch

Taper/Taper joint  
8-40 inch



Quick-Lock® adhesive-bonded joint



Taper/Taper adhesive-bonded joint

**Thermosetting adhesive for bonded joints:** Both Quick-Lock and Taper/Taper joints use PSX™-34 and PSX™-60 two-part epoxies.

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## Pipe Series

### **Pipe**

Filament-wound Glassfiber Reinforced Epoxy (GRE) pipe for Bondstrand adhesive-bonding systems.

### **Fittings**

A wide range of lined filament-wound Glassfiber Reinforced Epoxy (GRE) fittings for Bondstrand adhesive-bonding systems. For special fittings, not listed in this product guide, please contact your NOV FGS representative.

### **Flanges**

Filament-wound Glassfiber Reinforced Epoxy (GRE) heavy-duty flanges and stub-end ring flanges for Taper/Taper and Quick-Lock adhesive bonding systems. Standard flange drilling patterns as per ANSI B16.5 (150 lb) for sizes 1" to 24" and ANSI B16.47, Series A (150 lb.) for sizes 26" to 40". Other flange drilling patterns, such as ANSI B16.5 (>150 lb.), DIN, ISO and JIS are also available.

### **Bondstrand 2000M**

Glassfiber Reinforced Epoxy (GRE) pipe system. Standard 0.5 mm internal resin-rich reinforced liner. Maximum operating temperature: 93°C (for higher temperature rating, consult NOV Fiber Glass Systems).

Maximum pressure rating: 17.2 bar (250 psi) for 1 - 16 inch, 16.0 bar (232 psi) for 18 - 40 inch. Minimum pressure: full vacuum.

External Pressure Requirements: In accordance with IMO Regulations.

### **Bondstrand 7000M (\* conductive)**

Glassfiber Reinforced Epoxy (GRE) pipe system. Maximum operating temperature: 93°C (for higher temperature rating, consult NOV Fiber Glass Systems) with comingled carbon fibers.

Maximum pressure rating: 17.2 bar (250 psi) for 1 - 16 inch, 16.0 bar (232 psi) for 18 - 40 inch. Minimum pressure: full vacuum.

External Pressure Requirements: In accordance with IMO Regulations.

### **\* Conductive**

Our conductive pipe systems have been developed to prevent accumulation of potentially dangerous levels of static electrical charges. Pipe, fittings and flanges contain high strength conductive filaments. Together with a conductive adhesive this provides an electrically continuous system.

Description	Bondstrand 2000M	Bondstrand 7000M
Pipe diameter	1-40 inch	1-40 inch
Joining system	Quick-Lock 1-6 inch Taper/Taper 8-40 inch	Quick-Lock 1-6 inch Taper/Taper 8-40 inch
Liner <sup>(1)</sup>	0.5 mm	-
Temperature <sup>(2)</sup>	93°C	93°C
Pressure Rating <sup>(3)</sup>	17.2 bar (1-16 inch) 16.0 bar (18-40 inch)	17.2 bar (1-16 inch) 16.0 bar (18-40 inch)

<sup>(1)</sup> Available without an internal liner

<sup>(2)</sup> For temperature above 93°C, please consult NOV Fiber Glass Systems

<sup>(3)</sup> See fitting tables for specific pressure rating for individual fittings

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## Joining System & Configuration

### Pipe

#### 25-150 mm (1-6 inch):

Quick-Lock (straight/taper) adhesive joint with integral pipe stop in bell end.  
End configuration: Integral Quick-Lock bell end x shaved straight spigot.

#### 200-1000 mm (8-40 inch):

Taper/Taper adhesive joint.

End configuration: Integral Taper bell x shaved taper spigot

### Fitting and Flanges

#### 25-150 mm (1-6 inch):

Quick-Lock (straight/ taper) adhesive joint with integral pipe stop in bell end.  
End configuration: Integral Quick-Lock bell ends.

#### 200-1000 mm (8-40 inch):

Taper/Taper adhesive joint.

End configuration: Integral Taper bell ends.

Note: <sup>(1)</sup>Pipe nipples, saddles and flanged fittings have different end configurations.

<sup>(1)</sup> Tolerance +/- 50 mm

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## Typical Pipe Length

Nominal Pipe Size		Joining System	Approximate Overall Length
mm	in		m
25-40	1-1½	Quick-Lock	3.0
50-150	2-6	Quick-Lock	5.85/9.0
200-250	8-10	Taper/Taper	5.85/11.89
300-400	12-16	Taper/Taper	5.85/11.89
450-1000	18-40	Taper/Taper	11.89

Note: Overall length varies from plant to plant. Consult NOV Fiber Glass Systems if exact overall length is required.

**Typical Pipe  
Dimensions  
and Weights**

**Bondstrand 2000M**

Nominal Pipe Size		Pipe Inside Diameter	Minimum Structural Wall Thickness [t]	Average Pipe Weight
[mm]	[inch]	[mm]	[mm]	[kg/m]
25	1	27.1	3.0	0.7
40	1.5	42.1	3.0	1.3
50	2	53.0	3.1	1.3
80	3	81.8	3.1	1.8
100	4	105.2	4.1	3.1
125	5	131.9	4.1	3.5
150	6	159.0	4.1	4.6
200	8	208.8	5.5	7.4
250	10	262.9	7.0	12
300	12	313.7	8.3	17
350	14	337.6	9.0	19
400	16	385.8	10.3	25
450	18	433.8	11.5	32
500	20	482.1	12.8	39
550	22	530.3	14.1	49
600	24	578.6	15.4	56
650	26	650.0	17.3	66
700	28	700.0	18.7	75
750	30	750.0	20.0	93
800	32	800.0	21.4	102
900	36	900.0	24.1	132
1000	40	1000.0	26.9	165

**Bondstrand 7000M**

Nominal Pipe Size		Pipe Inside Diameter	Minimum Struct. Wall Thickness [t]	Average Pipe Weight
[mm]	[inch]	[mm]	[mm]	[kg/m]
25	1	27.1	3.5	0.7
40	1.5	42.1	3.5	1.3
50	2	53.0	3.6	1.3
80	3	81.8	3.6	1.8
100	4	105.2	4.6	3.1
125	5	131.9	4.6	3.5
150	6	159.0	4.6	4.6
200	8	208.8	5.5	7.4
250	10	262.9	7.0	12
300	12	313.7	8.3	17
350	14	337.6	9.0	19
400	16	385.8	10.3	25
450	18	433.8	11.5	32
500	20	482.1	12.8	39
550	22	530.3	14.1	49
600	24	578.6	15.4	56
650	26	650.0	17.3	66
700	28	700.0	18.7	75
750	30	750.0	20.0	93
800	32	800.0	21.4	102
900	36	900.0	24.1	132
1000	40	1000.0	26.9	165

Outside diameters of pipe in 250 and 300 mm sizes exceed iron pipe dimensions of ISO 559-1977 (273 and 324 mm, respectively) and cast iron pipe dimensions of ISO 13-1 978 (274 and 326 mm, respectively).

<b>Typical Mechanical Properties</b>				
Pipe Property	Units	Value 21°C	Value 93°C	Method
Hydrostatic Design Basis	N/mm <sup>2</sup>	161 <sup>(1)</sup>	121	ASTM D2992, Proc. B (20 years)
Ultimate Hoop Stress at Weeping	N/mm <sup>2</sup>	280	334	ASTM D1599
<b>Circumferential</b>				
Hoop Tensile Strength	N/mm <sup>2</sup>	380	-	ASTM D2290
Hoop Tensile Modulus	N/mm <sup>2</sup>	26700	16300	ASTM D2290
Poisson's Ratio $\nu_{ha}$ <sup>(2)</sup>	-	0.61	0.80	NOV FGS
<b>Longitudinal</b>				
Axial Tensile Strength	N/mm <sup>2</sup>	80	65	ASTM D2105
Axial Strength Modulus	N/mm <sup>2</sup>	15500	8550	ASTM D2105
Poisson's Ratio $\nu_{ah}$ <sup>(3)</sup>	-	0.35	0.42	ASTM D2105
Axial Bending Strength	N/mm <sup>2</sup>	85	-	NOV FGS
Axial Bending Modulus	N/mm <sup>2</sup>	15500	9900	ASTM D2925
Shear Modulus	N/mm <sup>2</sup>	12100	11500	NOV FGS
<b>Typical Physical Properties</b>				
Pipe Property	Units	Value	Method	
Thermal Conductivity Pipe Wall	W/m°C	0.33	NOV FGS	
Thermal Expansion @ 21°C	mm/mm°C	18 x 10 <sup>-6</sup>	ASTM D696	
Thermal Expansion @ 93°C	mm/mm°C	24 x 10 <sup>-6</sup>	ASTM D696	
Flow Efficient, Hazen Williams	-	150	-	
Absolute Roughness	m	5.3 x 10 <sup>-6</sup>	-	
Density	kg/m <sup>3</sup>	1800	-	
Specific Gravity	-	1.8	ASTM D792	
Specific Heat	J/kg°C	910	-	
Grounding Resistance @ 500 Volt-Pipe	Ohm/m	<1 x 10 <sup>-6</sup>	ASTM D257	
Grounding Resistance @ 500 Volt-Ftg.	Ohm/ea	<1 x 10 <sup>-6</sup>	ASTM D257	
Shielding Capability	Volt	100	-	

<sup>(1)</sup> Value obtained at 65°C

<sup>(2)</sup>  $\nu_{ha}$  = The ratio of axial strain to hoop strain resulting from stress in the hoop direction.

<sup>(3)</sup>  $\nu_{ah}$  = The ratio of hoop strain to axial strain resulting from stress in the axial direction.

## Ultimate Collapse Pressure

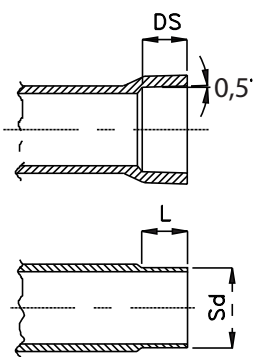
Ultimate short-term external failure pressure at 65°C

Nominal Pipe Size		Internal Pressure Static <sup>(1)</sup>	2000M	7000M
[mm]	[inch]	[bar]	[bar]	[bar]
25	1	17.2	702	742
40	1.5	17.2	191	198
50	2	17.2	105	108
80	3	17.2	29.2	29.7
100	4	17.2	31.9	32.4
125	5	17.2	16.2	16.4
150	6	17.2	9.3	9.4
200	8	17.2	9.9	10.0
250	10	17.2	10.2	10.3
300	12	17.2	10.1	10.1
350	14	17.2	10.3	10.3
400	16	17.2	10.3	10.4
450	18	16.0	10.1	10.2
500	20	16.0	10.2	10.2
550	22	16.0	10.2	10.3
600	24	16.0	10.3	10.3
650	26	16.0	10.3	10.3
700	28	16.0	10.4	10.4
750	30	16.0	10.3	10.3
800	32	16.0	10.4	10.4
900	36	16.0	10.4	10.5
1000	40	16.0	10.6	10.6

<sup>(1)</sup> Up to 93°C.

## Quick-Lock® Dimensions

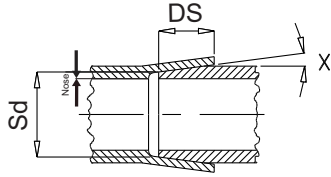
Dimensions for Quick-Lock bell & spigot adhesive bonded joints



Nominal Pipe Size		Insertion Depth (Ds)	Spigot Diameter		Spigot Length	
[mm]	[inch]		Min Sd	Max Sd	Max L	Min L
25	1	27	32.6	32.9	28.5	31.0
40	1.5	32	47.5	47.8	33.5	36.0
50	2	46	59.2	59.6	49.0	52.0
80	3	46	87.6	88.0	49.0	52.0
100	4	46	112.5	112.9	49.0	52.0
125	5	57	139.5	139.9	58.5	61.5
150	6	57	166.2	166.6	59.0	62.0

## Taper/Taper Dimensions

Tapered spigot dimensions for adhesive bonded Taper/Taper joints



Nominal Pipe Size		Taper Angle	Insertion Depth	Nominal Spigot Nose Thickness	Dia of Spigot at Nose
[mm]	[inch]	X [degrees]	Ds [mm]	Nose [mm]	Sd [mm]
200	8	2.5	65	3.1	215.0
250	10	2.5	80	4.1	271.0
300	12	2.5	95	4.7	323.0
350	14	2.5	100	5.2	348.0
400	16	2.5	110	6.1	398.0
450	18	2.5	114	4.6	443.0
500	20	2.5	127	5.0	492.2
600	24	2.5	178	3.8	586.3
700	28	1.75	178	6.4	712.9
750	30	1.75	178	4.2	758.4
800	32	1.75	178	8.9	817.8
900	36	1.75	203	5.6	911.3
1000	40	1.75	320	8.1	1016.3



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## Span Length

### *Bondstrand 2000M*

Nominal Pipe Size		Single Span <sup>(1)</sup>	Continuous Span <sup>(1)</sup>
[mm]	[inch]	[m]	[m]
25	1	2.6	3.3
40	1.5	2.9	3.7
50	2	3.1	4.0
80	3	3.5	4.5
100	4	4.0	5.1
125	5	4.3	5.4
150	6	4.5	5.7
200	8	5.1	6.5
250	10	5.8	7.3
300	12	6.3	8.0
350	14	6.5	8.3
400	16	7.0	8.8
450	18	7.4	9.3
500	20	7.7	9.8
600	24	8.5	10.8
700	28	9.3	11.8
750	30	9.6	12.2
800	32	10.0	12.7
900	36	10.5	13.4
1000	40	11.1	14.1

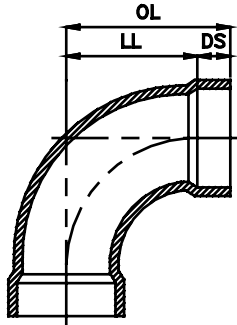
### *Bondstrand 7000M*

Nominal Pipe Size		Single Span <sup>(1)</sup>	Continuous Span <sup>(1)</sup>
[mm]	[inch]	[m]	[m]
25	1	2.6	3.3
40	1.5	2.9	3.8
50	2	3.1	4.1
80	3	3.5	4.5
100	4	4.0	5.2
125	5	4.3	5.6
150	6	4.5	5.9
200	8	5.0	6.5
250	10	5.7	7.3
300	12	6.2	8.0
350	14	6.4	8.3
400	16	6.9	8.8
450	18	7.3	9.3
500	20	7.7	9.8
600	24	8.4	10.8
700	28	9.3	11.8
750	30	9.6	12.2
800	32	9.9	12.7
900	36	10.5	13.4
1000	40	11.1	14.1

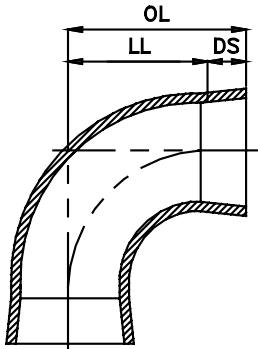
<sup>(1)</sup>Span recommendations are based on pipes filled with water having a density of 1000 kg/m<sup>3</sup>. No provisions for the weight of valves, flanges or other heavy objects were considered in the calculations.  
Note: ISO 14692 recommends a maximum support span length of 6.0 m.

## Elbows 90°

Filament-wound 90° elbows with integral Quick-Lock (1-6 inch) or Taper/Taper (8-40 inch) socket ends for adhesive bonding.



Quick-Lock

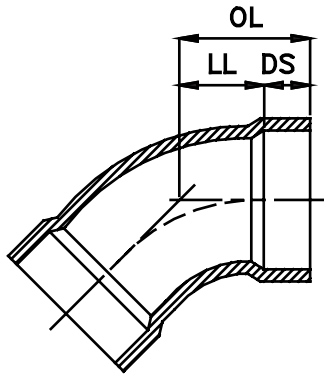


Taper/Taper

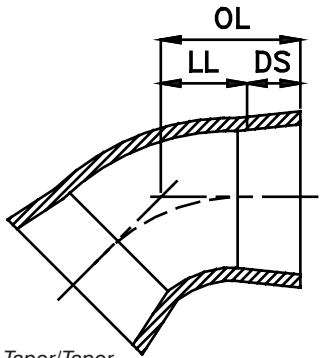
Nominal Pipe Size		Laying Length (LL)	Overall Length (OL)	Max. Working Pressure	Average Weight
[mm]	[inch]	[mm]	[mm]	[bar]	[kg]
25	1	65	92	17.2	0.3
40	1.5	81	113	17.2	0.4
50	2	76	122	17.2	0.5
80	3	114	160	17.2	1.1
100	4	152	198	17.2	1.6
125	5	195	252	17.2	2.7
150	6	229	286	17.2	3.6
200	8	315	380	17.2	6.8
250	10	391	471	17.2	11
300	12	472	567	17.2	18
350	14	364	464	17.2	26
400	16	402	512	17.2	31
450	18	458	572	16.0	53
500	20	508	635	16.0	65
550	22	559	711	16.0	94
600	24	584	762	16.0	122
650	26	660	838	16.0	180
700	28	711	889	16.0	205
750	30	762	940	16.0	243
800	32	813	991	16.0	330
900	36	915	1118	16.0	417
1000	40	1065	1385	16.0	489

### Elbows 45°

Filament-wound 45° Quick-Lock (1-6 inch) and Taper/Taper (8-40 inch) socket ends for adhesive bonding.



Quick-Lock

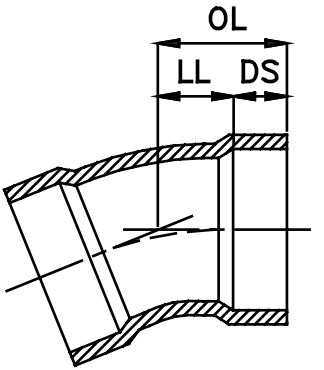


Taper/Taper

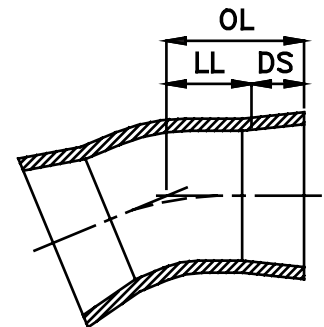
Nominal Pipe Size		Laying Length (LL)	Overall Length (OL)	Maximum Working Pressure	Average Weight
[mm]	[inch]	[mm]	[mm]	[bar]	[kg]
25	1	22	49	17.2	0.2
40	1.5	29	61	17.2	0.3
50	2	35	81	17.2	0.4
80	3	51	97	17.2	0.8
100	4	64	110	17.2	1.1
125	5	84	141	17.2	1.8
150	6	95	152	17.2	2.4
200	8	137	202	17.2	4.3
250	10	169	249	17.2	7.3
300	12	205	300	17.2	11.0
350	14	125	225	17.2	17.0
400	16	142	252	17.2	20.0
450	18	191	305	16.0	33
500	20	210	337	16.0	40
600	24	252	430	16.0	82
700	28	295	473	16.0	140
750	30	322	500	16.0	164
800	32	337	515	16.0	283
900	36	400	603	16.0	283
1000	40	475	798	16.0	334

### Elbows 22½°

Filament-wound 22½° elbows with integral Quick-Lock (1-6 inch) and Taper/Taper (8-40 inch) socket ends for adhesive bonding.



Quick-Lock

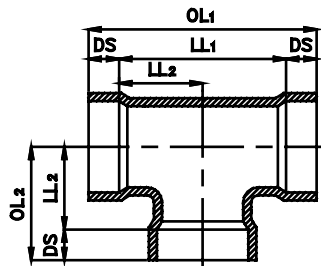


Taper/Taper

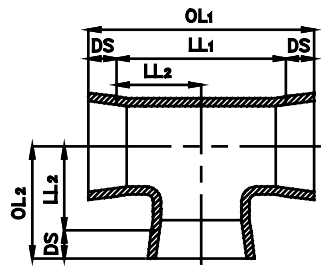
Nominal Pipe Size		Laying Length (LL)	Overall Length (OL)	Maximum Working Pressure	Average Weight
[mm]	[inch]	[mm]	[mm]	[bar]	[kg]
25	1	9	36	17.2	0.1
40	1.5	9	41	17.2	0.2
50	2	13	59	17.2	0.5
80	3	21	67	17.2	0.7
100	4	29	75	17.2	1
125	5	43	100	17.2	1.4
150	6	43	100	17.2	1.9
200	8	76	141	17.2	3.9
250	10	68	148	17.2	5.9
300	12	86	181	17.2	10.4
350	14	71	171	17.2	12
400	16	85	195	17.2	14
450	18	110	224	16.0	23
500	20	101	228	16.0	28
600	24	122	300	16.0	57
700	28	142	320	16.0	98
750	30	152	330	16.0	115
900	36	182	385	16.0	198
1000	40	258	578	16.0	234

## Equal Tees

Filament-wound equal Tee with integral Quick-Lock (1-6 inch) or Taper/Taper (8-40 inch) socket ends for adhesive bonding.



Quick-Lock

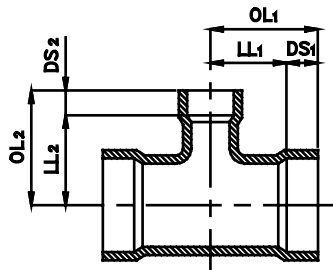


Taper/Taper

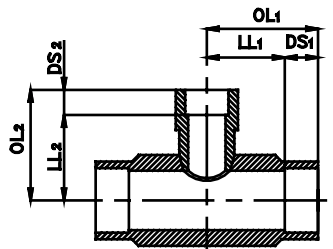
Nominal Pipe Size		Laying Length total run (LL1)	Overall Length total run (OL1)	Laying Length branch (LL2)	Overall Length branch (OL2)	Maximum Working Pressure	Average Weight
[mm]	[inch]	[mm]	[mm]	[mm]	[mm]	[bar]	[kg]
25	1	54	108	27	54	17.2	0.2
40	1.5	60	124	30	62	17.2	0.4
50	2	128	220	64	110	17.2	1
80	3	172	264	86	132	17.2	1.8
100	4	210	302	105	151	17.2	2.5
125	5	254	368	127	184	17.2	5
150	6	286	400	143	200	17.2	6.7
200	8	376	506	188	253	17.2	10
250	10	452	612	226	306	17.2	18
300	12	546	736	273	368	17.2	29
350	14	544	744	272	372	17.2	37
400	16	590	810	295	405	17.2	56
450	18	648	876	324	438	16.0	69
500	20	712	966	356	483	16.0	92
600	24	838	1194	419	597	16.0	168
700	28	964	1320	482	660	16.0	285
750	30	1016	1372	508	686	16.0	337
800	32	1090	1446	545	723	16.0	459
900	36	1220	1626	610	813	16.0	581
1000	40	1466	2106	733	1053	16.0	686

## Reducing Tees

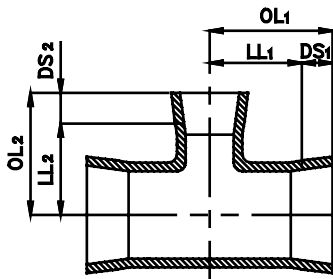
Filament-wound standard and fabricated reducing tees with integral Quick-Lock (1-6 inch) or Taper/Taper (8-40 inch) socket ends for adhesive bonding.



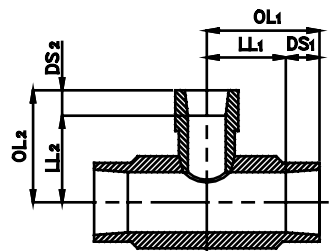
Quick-Lock Filament wound



Quick-Lock Fabricated



Taper/Taper Filament wound

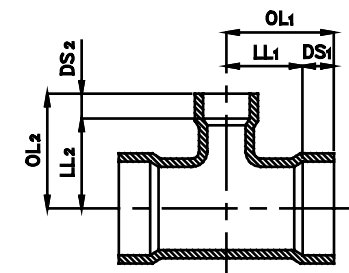


Taper/Taper Fabricated

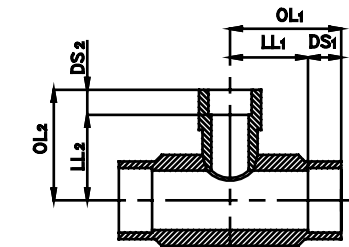
Nominal Pipe Size (runxbranch)	Laying Length (LL1) half run	Overall Length (OL1) half run	Laying Length (LL2) branch	Overall Length (OL2) branch	Maximum Working Pressure	Average Weight	
[mm]	[inch]	[mm]	[mm]	[mm]	[bar]	[kg]	
40x25	1.5x1	30	62	30	57	17.2	0.6
50x25	2x1	64	110	57	84	17.2	0.9
50x40	2x1.5	64	110	57	89	17.2	1
80x25	3x1	86	132	76	103	17.2	1.6
80x40	3x1.5	86	132	76	108	17.2	1.6
80x50	3x2	86	132	76	122	17.2	1.7
100x25	4x1	72	118	194	221	17.2	7.5
100x40	4x1.5	89	136	194	226	17.2	9.0
100x50	4x2	105	151	89	135	17.2	2.1
100x80	4x3	105	151	98	144	17.2	2.3
125x50	5x2	127	184	102	148	17.2	3.4
125x80	5x3	127	184	111	157	17.2	4
125x100	5x4	127	184	118	164	17.2	4.6
150x25	6x1	83	140	221	248	17.2	11.7
150x40	6x1.5	101	158	221	253	17.2	13.8
150x50	6x2	143	200	114	160	17.2	6.2
150x80	6x3	143	200	124	170	17.2	5.7
150x100	6x4	143	200	130	176	17.2	5.9
150x125	6x5	143	200	136	193	17.2	6.2
200x25	8x1	88	153	245	272	17.2	15.0
200x40	8x1.5	88	153	246	278	17.2	17.5
200x50	8x2	88	153	245	291	17.2	19.9
200x80	8x3	188	253	149	195	17.2	9.1
200x100	8x4	188	253	162	208	17.2	9.7
200x150	8x6	188	253	168	225	17.2	11.4
250x25	10x1	88	168	273	300	17.2	18.1
250x40	10x1.5	88	168	273	305	17.2	21
250x50	10x2	88	168	273	318	17.2	24
250x80	10x3	100	180	273	318	17.2	24
250x100	10"x4	226	306	184	230	17.2	14.8
250x150	10x6	226	306	194	251	17.2	15.5
250x200	10x8	226	306	203	268	17.2	16.5
300x25	12x1	88	183	298	325	17.2	21
300x40	12x1.5	88	183	298	330	17.2	25
300x50	12x2	88	183	298	344	17.2	29
300x80	12x3	100	195	298	344	17.2	29
300x100	12x4	273	368	206	252	17.2	21
300x150	12x6	273	368	219	276	17.2	22
300x200	12x8	273	368	229	294	17.2	23
300x250	12x10	273	368	241	321	17.2	24

Note: The regular font style numbers are filament wound tees. The lightly shaded *Italic* numbers are fabricated tees.

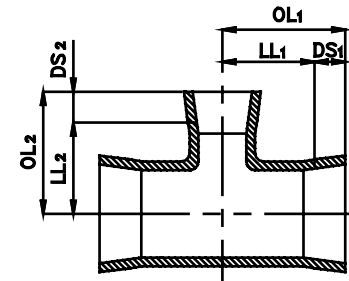
## Reducing Tees (con't)



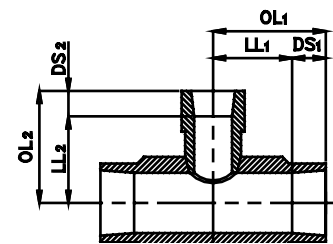
Quick-Lock Filament wound



Quick-Lock Fabricated



Taper/Taper Filament wound

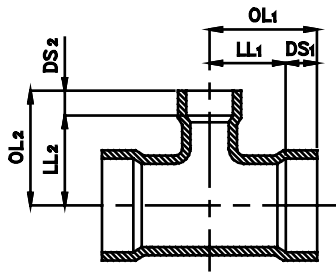


Taper/Taper Fabricated

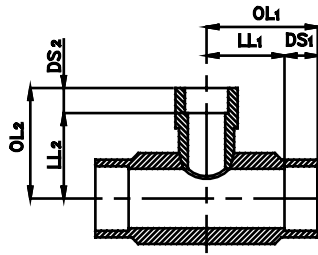
Nominal Pipe Size (runxbranch) [mm] [inch]	Laying Length (LL1) half run [mm] [inch]	Overall Length (OL1) half run [mm] [inch]	Laying Length (LL2) branch [mm] [inch]	Overall Length (OL2) branch [mm] [inch]	Maximum Working Pressure [bar]	Average Weight [kg]
350x25	88	188	313	340	17.2	24
350x40	88	188	313	345	17.2	28
350x50	88	188	313	359	17.2	31
350x80	100	200	313	359	17.2	31
350x100	113	213	313	359	17.2	31
350x150	272	372	244	301	17.2	29
350x200	272	372	254	319	17.2	30
350x250	272	372	267	347	17.2	32
350x300	272	372	288	383	17.2	34
400x25	88	198	338	365	17.2	29
400x40	88	198	338	370	17.2	33
400x50	88	198	338	384	17.2	37
400x80	100	210	338	384	17.2	37
400x100	113	223	338	384	17.2	37
400x150	295	405	264	321	17.2	37
400x200	295	405	273	338	17.2	38
400x250	295	405	283	363	17.2	41
400x300	295	405	304	399	17.2	45
400x350	295	405	292	392	17.2	49
450x25	88	202	358	385	16.0	31
450x40	88	202	358	390	16.0	31
450x50	88	202	358	404	16.0	22
450x80	100	214	358	404	16.0	35
450x100	113	227	358	404	16.0	38
450x150	138	252	367	424	16.0	45
450x200	324	438	306	371	16.0	53
450x250	324	438	319	399	16.0	60
450x300	324	438	328	423	16.0	67
450x350	324	438	317	417	16.0	66
450x400	324	438	319	429	16.0	69
500x25	88	215	382	409	16.0	35
500x40	88	215	382	414	16.0	35
500x50	88	215	382	428	16.0	36
500x80	100	227	382	428	16.0	39
500x100	113	240	382	428	16.0	43
500x150	138	265	391	448	16.0	50
500x250	356	483	344	424	16.0	77
500x300	356	483	354	449	16.0	82
500x350	356	483	343	443	16.0	85
500x400	356	483	344	454	16.0	85
500x450	356	483	350	464	16.0	89

Note: Tees main-run (18-40 inch) with Quick-Lock socket branch (1-6 inch) are fabricated Tees. The regular font style numbers are filament wound tees. The lightly shaded *italic* numbers are fabricated tees.

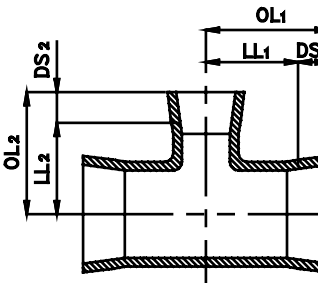
## Reducing Tees (con't)



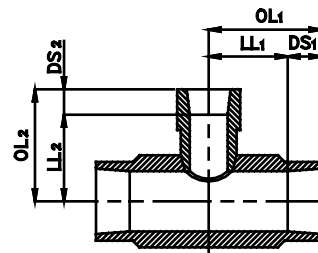
Quick-Lock Filament wound



Quick-Lock Fabricated



Taper/Taper Filament wound

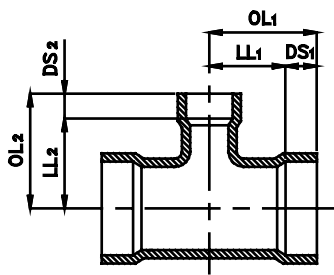


Taper/Taper Fabricated

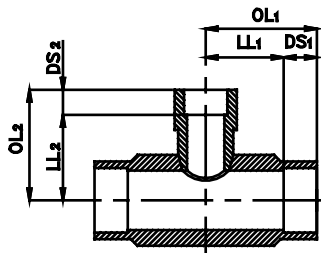
Nominal Pipe Size (runxbranch)		Laying Length (LL1) half run	Overall Length (OL1) half run	Laying Length (LL2) branch	Overall Length (OL2) branch	Maximum Working Pressure [bar]	Average Weight [kg]
[mm]	[inch]	[mm]	[mm]	[mm]	[mm]		
550x200	22x8	388	540	357	422	16.0	80
550x250	22x10	388	540	370	450	16.0	85
550x300	22x12	388	540	379	474	16.0	90
550x350	22x14	388	540	368	468	16.0	94
550x400	22x16	388	540	370	480	16.0	94
550x450	22x18	388	540	375	489	16.0	98
550x500	22x20	388	540	381	508	16.0	102
600x25	24x1	88	266	430	457	16.0	51
600x40	24x1.5	88	266	430	462	16.0	51
600x50	24x2	88	266	430	476	16.0	52
600x80	24x3	100	278	430	476	16.0	56
600x100	24x4	113	291	430	476	16.0	61
600x150	24x6	138	316	439	496	16.0	69
600x200	24x8	419	597	412	477	16.0	78
600x250	24x10	419	597	386	466	16.0	85
600x300	24x12	419	597	417	512	16.0	85
600x350	24x14	419	597	394	494	16.0	101
600x400	24x16	419	597	395	505	16.0	99
600x450	24x18	419	597	413	527	16.0	137
600x500	24x20	419	597	406	533	16.0	156
700x25	28x1	88	266	491	518	16.0	59
700x40	28x1.5	88	266	491	523	16.0	59
700x50	28x2	88	266	491	537	16.0	59
700x80	28x3	100	278	491	537	16.0	64
700x100	28x4	113	291	491	537	16.0	70
700x150	28x6	138	316	500	557	16.0	80
700x350	28x14	482	660	490	590	16.0	147
700x400	28x16	482	660	500	610	16.0	166
700x450	28x18	482	660	500	614	16.0	189
700x500	28x20	482	660	506	633	16.0	210
700x600	28x24	482	660	506	684	16.0	252
750x25	30x1	88	266	516	543	16.0	63
750x40	30x1.5	88	266	516	548	16.0	63
750x50	30x2	88	266	516	562	16.0	63
750x80	30x3	100	278	516	562	16.0	69
750x100	30x4	113	291	516	562	16.0	74
750x150	30x6	138	316	525	582	16.0	85
750x300	30x12	508	686	765	860	16.0	118
750x350	30x14	508	686	722	822	16.0	157
750x400	30x16	508	686	698	808	16.0	178
750x450	30x18	508	686	488	602	16.0	202
750x500	30x20	508	686	495	622	16.0	225
750x600	30x24	508	686	481	659	16.0	270

Note: Tees main-run (18-40 inch) with Quick-Lock socket branch (1-6 inch) are fabricated Tees. The regular font style numbers are filament wound tees. The lightly shaded *Italic* numbers are fabricated tees.

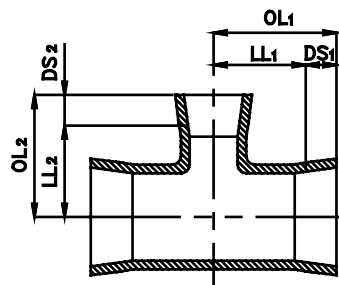
## Reducing Tees (con't)



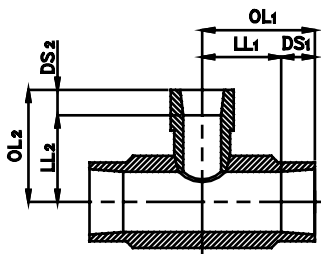
Quick-Lock Filament wound



Quick-Lock Fabricated



Taper/Taper Filament wound



Taper/Taper Fabricated

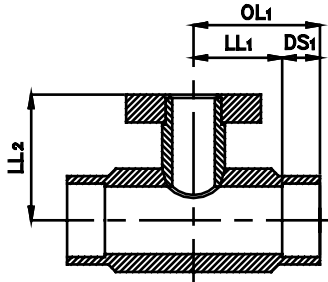
Nominal Pipe Size (runxbranch)	Laying Length (LL1) half run	Overall Length (OL1) half run	Laying Length (LL2) branch	Overall Length (OL2) branch	Maximum Working Pressure	Average Weight
[mm]	[mm]	[mm]	[mm]	[mm]	[bar]	[kg]
800x25	32x1	88	266	541	568	16.0 66
800x40	32x1.5	88	266	541	573	16.0 67
800x50	32x2	88	266	541	587	16.0 67
800x80	32x3	100	278	541	587	16.0 73
800x100	32x4	113	291	541	587	16.0 79
800x150	32x6	138	316	550	607	16.0 90
800x500	32x20	545	723	523	650	16.0 258
800x600	32x24	545	723	523	701	16.0 310
800x700	32x28	545	723	532	710	16.0 348
800x750	32x30	545	723	534	712	16.0 387
900x25	36x1	88	291	591	618	16.0 78
900x40	36x1.5	88	291	591	623	16.0 78
900x50	36x2	88	291	591	637	16.0 78
900x80	36x3	100	303	591	637	16.0 85
900x100	36x4	113	316	591	637	16.0 92
900x150	36x6	138	341	600	657	16.0 105
900x400	36x16	610	813	563	673	16.0 270
900x450	36x18	610	813	563	677	16.0 290
900x500	36"20	610	813	563	690	16.0 323
900x600	36x24	610	813	541	719	16.0 387
900x700	36x28	610	813	570	748	16.0 459
900x750	36x30	610	813	584	762	16.0 484
1000x25	40x1	120	440	641	668	16.0 92
1000x40	40x1.5	120	440	641	673	16.0 92
1000x50	40x2	120	440	641	687	16.0 92
1000x80	40x3	132	452	641	687	16.0 100
1000x100	40x4	145	465	641	687	16.0 100
1000x600	40x24	733	1053	593	771	16.0 456
1000x700	40x28	733	1053	632	810	16.0 541
1000x750	40x30	733	1053	633	811	16.0 571
1000x800	40x32	733	1053	652	830	16.0 605
1000x900	40x36	733	1053	652	855	16.0 634

Note: Tees main-run (18-40 inch) with Quick-Lock socket branch (1-6 inch) are fabricated Tees. The regular font style numbers are filament wound tees. The lightly shaded *Italic* numbers are fabricated tees.

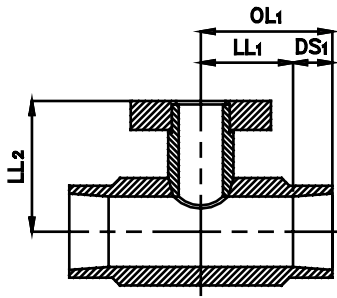


## Fabricated Reducing Tees with Flanged Branch

Integral Quick-Lock (4-6 inch) or Taper (8-16 inch) socket ends with flanged branch



Quick-Lock



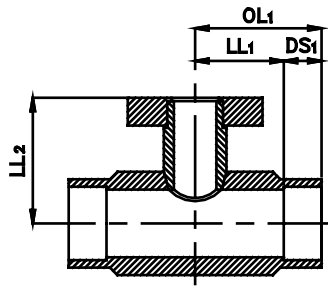
Taper/Taper

Nominal Pipe Size (runxbranch)	Laying Length (LL1) half run	Overall Length (OL1) half run	Laying Length (LL2) branch	Maximum Working Pressure	Average Weight
[mm]	[inch]	[mm]	[mm]	[bar]	[kg]
100x25	4x1	72	224	17.2	8.0
100x40	4x1.5	89	229	17.2	9.7
150x25	6x1	83	251	17.2	12.2
150x40	6x1.5	101	256	17.2	14.5
200x25	8x1	88	276	17.2	15.5
200x40	8x1.5	88	281	17.2	18.2
200x50	8x2	88	295	17.2	21
250x25	10x1	88	303	17.2	18.6
250x40	10x1.5	88	308	17.2	22
250x50	10x2	88	322	17.2	26
250x80	10x3	100	323	17.2	26
300x25	12x1	88	329	17.2	22
300x40	12x1.5	88	334	17.2	26
300x50	12x2	88	348	17.2	30
300x80	12x3	100	349	17.2	31
350x25	14x1	88	344	17.2	24
350x40	14x1.5	88	349	17.2	28
350x50	14x2	88	363	17.2	33
350x80	14x3	100	364	17.2	33
350x100	14x4	113	364	17.2	34
400x25	16x1	85	369	17.2	29
400x40	16x1.5	103	374	17.2	34
400x50	16x2	118	388	17.2	39
400x80	16x3	118	389	17.2	39
400x100	16x4	118	389	17.2	40

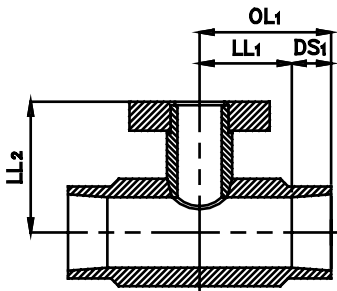
Note: Other sizes, or multiple size branched tees available on request. Please contact NOV Fiber Glass Systems.

**Fabricated Reducing Tees with Flanged Branch (con't)**

Integral Taper (18-40 inch) socket ends with flanged branch



Quick-Lock



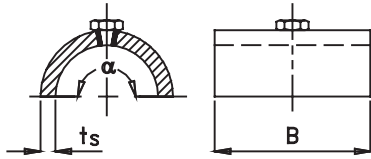
Taper/Taper

Nominal Pipe Size (runxbranch)	Laying Length (LL1) half run	Overall Length (OL1) half run	Laying Length (LL2) branch	Maximum Working Pressure	Average Weight
[mm]	[inch]	[mm]	[mm]	[bar]	[kg]
450x25	18x1	88	202	16.0	32
450x40	18x1.5	88	202	16.0	32
450x50	18x2	88	202	16.0	33
450x80	18x3	100	214	16.0	37
450x100	18x4	113	227	16.0	41
450x150	18x6	138	252	16.0	49
500x25	20x1	88	215	16.0	36
500x40	20x1.5	88	215	16.0	36
500x50	20x2	88	215	16.0	37
500x80	20x3	100	227	16.0	41
500x100	20x4	113	240	16.0	46
600x25	24x1	88	266	16.0	52
600x40	24x1.5	88	266	16.0	52
600x50	24x2	88	266	16.0	53
600x80	24x3	100	278	16.0	58
600x100	24x4	113	291	16.0	63
650x25	26x1	88	266	16.0	78
650x40	26x1.5	88	266	16.0	78
650x50	26x2	88	266	16.0	78
650x80	26x3	100	278	16.0	83
650x100	26x4	113	291	16.0	88
700x25	28x1	88	266	16.0	59
700x40	28x1.5	88	266	16.0	59
700x50	28x2	88	266	16.0	61
700x80	28x3	100	278	16.0	67
700x100	28x4	113	291	16.0	73
750x25	30x1	88	266	16.0	63
750x40	30x1.5	88	266	16.0	63
750x50	30x2	88	266	16.0	64
750x80	30x3	100	278	16.0	71
750x100	30x4	113	291	16.0	77
800x25	32x1	88	266	16.0	67
800x40	32x1.5	88	266	16.0	67
800x50	32x2	88	266	16.0	68
800x80	32x3	100	278	16.0	75
800x100	32x4	113	291	16.0	82
900x25	36x1	88	291	16.0	78
900x40	36x1.5	88	291	16.0	79
900x50	36x2	88	291	16.0	80
900x80	36x3	100	303	16.0	87
900x100	36x4	113	316	16.0	94
1000x25	40x1	120	440	16.0	92
1000x40	40x1.5	120	440	16.0	93
1000x50	40x2	120	440	16.0	94
1000x80	40x3	132	452	16.0	103
1000x100	40x4	145	465	16.0	113

Note: Other sizes, or multiple size branched tees available on request. Please contact NOV Fiber Glass Systems.

## Bushing Saddles

Filament-wound pipe saddles with stainless steel, 1/2 inch and 3/4 inch threaded bushings.<sup>(1)</sup>

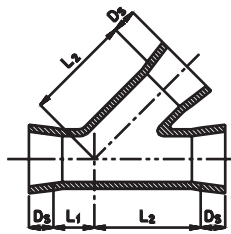


Nominal Pipe Size		Angle $\alpha$	Saddle Length (B)	Saddle Thicken. (ts)	Maximum Working Pressure	Average Weight	Required Adhesive Kits	
[mm]	[inch]	[degree]	[mm]	[mm]	[bar]	[kg]	[3 Oz]	[6 Oz]
50	2	180	100	14	17.2	0.5	1	-
80	3	180	100	14	17.2	0.6	1	-
100	4	180	100	14	17.2	0.8	1	-
125	5	180	100	14	17.2	0.9	-	1
150	6	180	100	14	17.2	1.0	-	1
200	8	180	100	14	17.2	1.2	-	1
250	10	180	100	14	17.2	1.6	1	1
300	12	180	100	14	12	1.9	1	1
350	14	180	100	14	12	2.1	1	1
400	16	180	100	14	12	2.5	-	2
450	18	90	100	14	12	3.3	-	1
500	20	90	100	14	12	3.7	1	1
600	24	90	100	14	12	4.4	-	2

<sup>(1)</sup> Consult NOV Fiber Glass Systems for other material types or other sized bushings.  
For higher pressures, above 16.0/12 bar, contact NOV Fiber Glass Systems.

## 45° Laterals

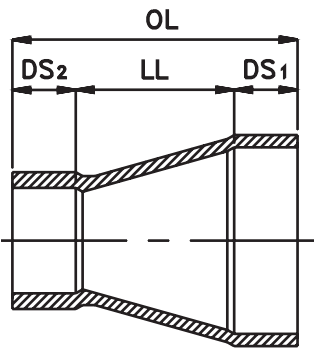
Filament-wound 45° laterals with integral Quick-Lock (2-6 inch) or Taper/Taper (8-16 inch) socket ends, for adhesive bonding.



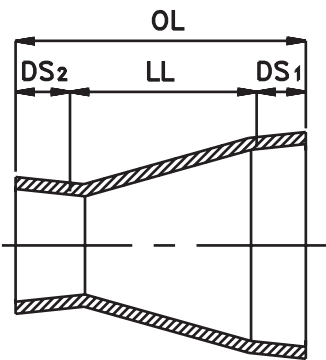
Nominal Pipe Size		Laying Length (LL1)	Overall Length (OL1)	Laying Length (LL2)	Overall Length (OL2)	Maximum Working Pressure	Average Weight
[mm]	[inch]	[mm]	[mm]	[mm]	[mm]	[bar]	[kg]
50	2	64	110	203	249	17.2	1.6
80	3	76	122	254	300	17.2	3.0
100	4	76	122	305	351	17.2	3.9
125	5	89	146	337	394	17.2	5.8
150	6	89	146	368	425	17.2	6.8
200	8	124	189	455	520	17.2	12.0
250	10	137	217	531	611	12	21
300	12	159	254	641	736	12	30
350	14	150	250	632	732	12	39
400	16	150	260	632	742	12	54

## Concentric Reducers

Filament-wound concentric reducers with integral Quick-Lock (1-6 inch) or Taper/Taper (8-40 inch) socket ends, for adhesive bonding.



Quick-Lock

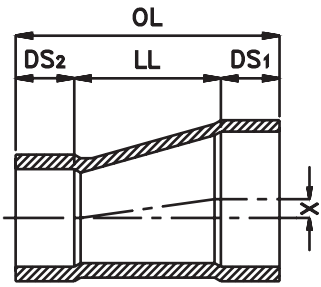


Taper/Taper

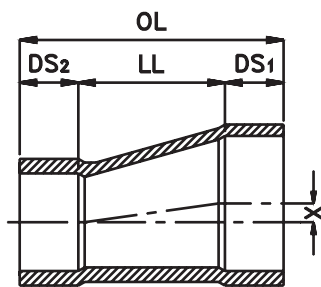
Nominal Pipe Size (runxrun)		Laying Length (LL)	Overall Length (OL)	Maximum Working Pressure	Average Weight
[mm]	[inch]	[mm]	[mm]	[bar]	[kg]
40x25	1.5x1	32	91	17.2	0.2
50x25	2x1	64	137	17.2	0.3
50x40	2x1.5	32	110	17.2	0.5
80x40	3x1.5	76	154	17.2	0.5
80x50	3x2	54	146	17.2	0.5
100x50	4x2	76	168	17.2	1.1
100x80	4x3	73	165	17.2	0.9
125x80	5x3	74	177	17.2	1.4
125x100	5x4	74	177	17.2	1.5
150x80	6x3	97	200	17.2	1.8
150x100	6x4	94	197	17.2	1.8
150x125	6x5	110	224	17.2	1.8
200x100	8x4	153	264	17.2	2.9
200x150	8x6	119	241	17.2	2.7
250x150	10x6	138	275	17.2	3.7
250x200	10x8	135	280	17.2	3.6
300x200	12x8	189	349	17.2	5.0
300x250	12x10	176	351	17.2	4.6
350x250	14x10	214	394	17.2	7.2
350x300	14x12	217	412	17.2	7.3
400x300	16x12	204	409	17.2	8.9
400x350	16x14	183	393	17.2	9.0
450x400	18x16	113	337	16.0	12.7
500x400	20x16	235	472	16.0	23
500x450	20x18	123	364	16.0	18.9
550x400	22x16	340	602	16.0	36
550x450	22x18	228	494	16.0	32
550x500	22x20	106	385	16.0	29
600x400	24x16	463	751	16.0	48
600x450	24x18	353	645	16.0	44
600x500	24x20	230	535	16.0	39
600x550	24x22	126	456	16.0	36
700x400	28x16	775	1063	16.0	79
700x450	28x18	661	953	16.0	74
700x500	28x20	542	847	16.0	69
700x600	28x24	311	667	16.0	67
750x400	30x16	886	1174	16.0	112
750x450	30x18	775	1067	16.0	107
750x500	30x20	653	958	16.0	100
750x600	30x24	422	778	16.0	87
750x650	30x26	240	596	16.0	72
750x700	30x28	111	467	16.0	57
800x450	32x18	920	1212	16.0	125
800x500	32x20	798	1103	16.0	109
800x600	32x24	570	926	16.0	94
800x700	32x28	259	615	16.0	82
800x750	32x30	148	504	16.0	71
900x500	36x20	1029	1359	16.0	210
900x600	36x24	799	1180	16.0	176
900x700	36x28	487	868	16.0	140
900x750	36x30	375	756	16.0	126
1000x900	40x36	310	833	16.0	182

## Eccentric Reducers

Filament-wound Eccentric Reducers with integral Quick-Lock (1-6 inch) or Taper/Taper (8-40 inch) socket ends, for adhesive bonding.



Quick-Lock

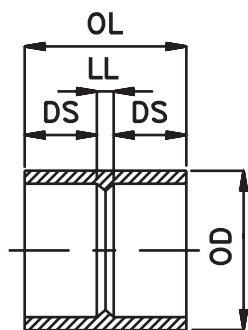


Taper/Taper

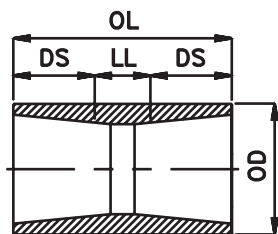
Nominal Pipe Size (runxrun)		Laying Length (LL)	Overall Length (OL)	Eccentricity (X)	Maximum Working Pressure	Average Weight
[mm]	[inch]	[mm]	[mm]	[mm]	[bar]	[kg]
40x25	1.5x1	56	115	7	17.2	0.2
50x25	2x1	100	173	13	17.2	0.3
50x40	2x1.5	44	122	6	17.2	0.5
80x40	3x1.5	150	228	20	17.2	0.5
80x50	3x2	108	200	14	17.2	0.5
100x50	4x2	200	292	27	17.2	1.1
100x80	4x3	93	185	12	17.2	0.9
125x100	5x4	101	204	14	17.2	1.5
150x80	6x3	293	396	39	17.2	1.8
150x100	6x4	200	303	27	17.2	1.8
150x125	6x5	100	214	13	17.2	1.8
200x100	8x4	405	516	52	17.2	2.9
200x150	8x6	205	327	25	17.2	2.7
250x150	10x6	410	547	53	17.2	3.7
250x200	10x8	235	380	27	17.2	3.6
300x200	12x8	429	589	53	17.2	5.0
300x250	12x10	229	404	26	17.2	4.6
350x250	14x10	340	520	42	17.2	7.2
350x300	14x12	159	354	16	17.2	7.3
400x300	16x12	344	549	41	17.2	8.9
400x350	16x14	215	425	25	17.2	9.0
450x300	18x12	450	640	63	16.0	15.6
450x350	18x14	322	525	43	16.0	14.2
450x400	18x16	197	413	18	16.0	12.7
500x400	20x16	324	553	39	16.0	23
500x450	20x18	197	438	22	16.0	18.9
600x400	24x16	580	860	93	16.0	48
600x450	24x18	450	742	73	16.0	44
600x500	24x20	325	630	48	16.0	39
750x400	30x24	451	807	86	16.0	87
900x400	36x24	832	1213	161	16.0	176
1000x800	40x32	739	1237	100	16.0	182
1000x900	40x36	419	942	52	16.0	192

## Couplings

Filament-wound couplings with integral Quick-Lock (1-6 inch) or Taper/Taper (8-40 inch) socket ends, for adhesive bonding.



Quick-Lock

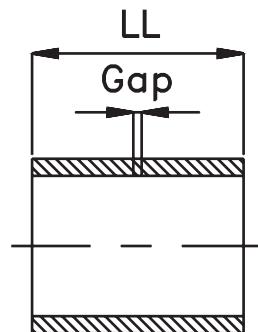


Taper/Taper

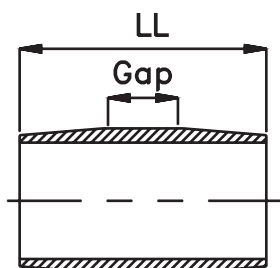
Nominal Pipe Size	[mm]	[inch]	Laying Length (LL)	[mm]	Overall Length (OL)	[mm]	Outside Diameter (OD)	[mm]	Maximum Working Pressure	[bar]	Average Weight	[kg]
25		1	9		63		42		17.2		0.1	
40		1.5	9		73		58		17.2		0.1	
50		2	9		101		79		17.2		0.3	
80		3	9		101		108		17.2		0.4	
100		4	9		101		133		17.2		0.6	
125		5	9		123		153		17.2		0.9	
150		6	9		123		183		17.2		1.1	
200		8	70		200		230		17.2		1.7	
250		10	70		230		289		17.2		2.3	
300		12	70		260		350		17.2		2.8	
350		14	70		270		377		17.2		4.6	
400		16	70		290		430		17.2		7.2	
450		18	70		298		463		16.0		10.7	
500		20	70		324		514		16.0		13.0	
600		24	70		426		618		16.0		18.8	
700		28	70		426		742		16.0		24	
750		30	70		426		795		16.0		25	
800		32	70		426		848		16.0		27	
900		36	70		476		950		16.0		35	
1000		40	70		710		1057		16.0		41	

## Nipples

Filament-wound nipples with integral Quick-Lock (1-6 inch) or Taper/Taper (8-40 inch) male ends, for adhesive bonding.



Quick-Lock



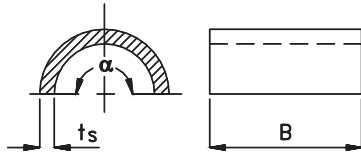
Taper/Taper

Nominal Pipe Size	[mm]	[inch]	Laying Length (LL)	[mm]	Gap <sup>(1)</sup>	[mm]	Maximum Working Pressure	[bar]	Average Weight	[kg]
25		1	57		3		17.2		0.1	
40		1.5	67		3		17.2		0.1	
50		2	95		3		17.2		0.1	
80		3	95		3		17.2		0.1	
100		4	95		3		17.2		0.2	
125		5	117		3		17.2		0.3	
150		6	117		3		17.2		0.4	
200		8	160		30		17.2		0.6	
250		10	190		30		17.2		0.9	
300		12	230		40		17.2		1.1	
350		14	240		40		17.2		3.1	
400		16	260		40		17.2		4.4	
450		18	278		50		16.0		5.9	
500		20	304		50		16.0		7.8	
600		24	406		50		16.0		12	
700		28	406		50		16.0		21	
750		30	406		50		16.0		22	
800		32	406		50		16.0		24	
900		36	456		50		16.0		36	
1000		40	690		50		16.0		51	

<sup>(1)</sup> Remaining gap after bonding.

## Support Saddles

Filament-wound pipe saddles for wear, support and anchor.



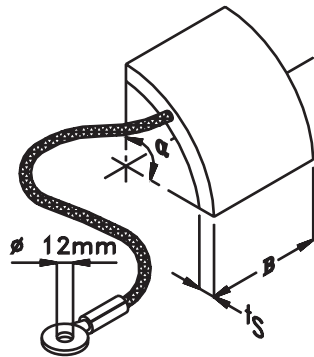
Nominal Pipe Size	Saddle Angle $\alpha$		Saddle Thickn. $t_s$	Saddle Weight B=100mm	Required Adhesive Kits	Saddle Weight B=150mm		Required Adhesive Kits	
	[mm]	[inch]				[degree]	[kg]		[3 and 6 oz]
25	1	180	14	0.2	1	-	0.3	1	-
40	1.5	180	14	0.3	1	-	0.5	1	-
50	2	180	14	0.4	1	-	0.6	1	-
80	3	180	14	0.5	1	-	0.8	-	1
100	4	180	14	0.7	1	-	1.1	-	1
125	5	180	14	0.8	-	1	1.2	-	1
150	6	180	14	0.9	-	1	1.4	-	1.5
200	8	180	14	1.1	-	1	1.7	-	1.5
250	10	180	14	1.5	-	1.5	2.3	-	2
300	12	180	14	1.8	-	1.5	2.7	-	2.5
350	14	180	14	2.0	-	1.5	3.0	-	2.5
400	16	180	14	2.4	-	2	3.6	-	3
450	18	180	16	-	-	-	3.2	-	2
500	20	180	16	-	-	-	3.6	-	2
600	24	180	16	-	-	-	4.3	-	2
700	28	180	16	-	-	-	5.1	-	3
750	30	180	16	-	-	-	5.5	-	3
800	32	180	16	-	-	-	5.8	-	3
900	36	180	16	-	-	-	6.5	-	4
1000	40	180	16	-	-	-	8.2	-	4

### Notes:

1. Filament-wound support saddles are intended for protection of pipe at supports and clamps, as well as for anchoring purposes. Support and anchor saddles are standard 180° sweeps. Saddles are supplied in standard lengths of 100 mm and 150 mm.
2. For special saddle lengths, thickness and/or sweep angles contact NOV Fiber Glass Systems.
3. Wear saddles are standard 90°. Weights of 90° sweep saddles are 50% of value shown.

## Grounding Saddles

Filament-wound pipe saddles for grounding in conductive piping systems.



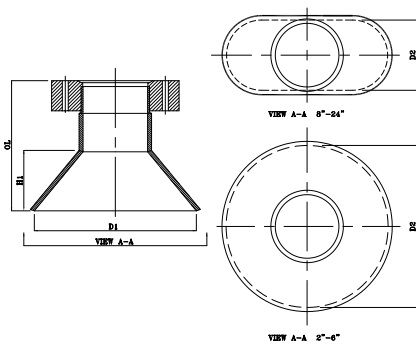
Nominal Pipe Size		Saddle Angle $\alpha$	Saddle Length B	Saddle Thickness $t_s$	Average Saddle Weight	Adhesive Kits
[mm]	[inch]	[degree]	[mm]	[mm]	[kg]	[3Oz]
25	1	90	76	14	0.1	1
40	1.5	90	76	14	0.1	1
50	2	90	76	14	0.1	1
80	3	90	76	14	0.1	1
100	4	90	76	14	0.2	1
125	5	90	76	14	0.3	1
150	6	90	76	14	0.3	1
200	8	45	76	14	0.2	1
250	10	45	76	14	0.2	1
300	12	45	76	14	0.2	1
350	14	45	76	14	0.3	1
400	16	45	76	14	0.3	1
450	18	22.5	76	16	0.2	1
500	20	22.5	76	16	0.2	1
600	24	22.5	76	16	0.3	1
700	28	22.5	76	16	0.3	2
750	30	22.5	76	16	0.4	2
800	32	22.5	76	16	0.4	3
900	36	22.5	76	16	0.4	3
1000	40	22.5	76	16	0.5	3

**Notes:**

1. Bondstrand conductive adhesive should be used for mounting onto pipe.
2. Saddles are supplied with a 600 mm length of stainless steel cable.

## Bell Mouths <sup>(1)</sup>

Filament-wound bell mouths with adhesive-bonded HD-flange.



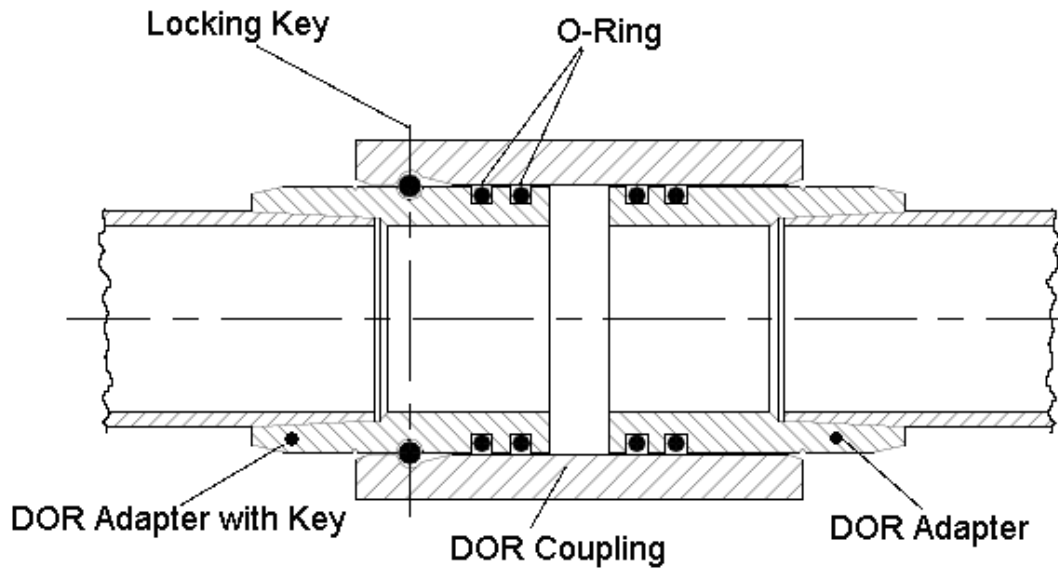
Nominal Pipe Size		Overall Length (OL)	Length of Bell Mouth (H1)	Internal Diameter (D1)	Internal Diameter (D2)	Average Weight <sup>(1)</sup>
[mm]	[inch]	[mm]	[mm]	[mm]	[mm]	[kg]
50	2	269	115	110	110	3.1
80	3	274	120	220	220	5.0
100	4	289	135	275	275	8.4
125	5	323	158	400	400	12.7
150	6	324	158	450	450	14.7
200	8	534	340	750	450	26
250	10	604	395	850	550	39
300	12	588	365	850	550	51
350	14	616	375	850	550	60
400	16	596	345	850	550	67
450	18	635	360	900	600	90
500	20	738	450	1100	600	119
600	24	879	540	1300	700	171

<sup>(1)</sup> For special shape or dimension bell mouths, contact NOV Fiber Glass Systems.

<sup>(2)</sup> Weights provided are for bell mouth with CL150 flange.



**Assembly of Double  
O-ring expansion joint**



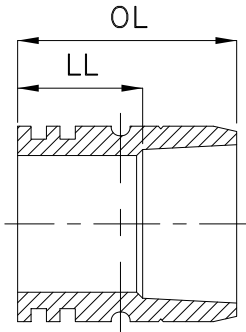
**Expansion Coupling**

Filament-wound Key-Lock expansion coupling with integral double O-ring Key-Lock female end one side and double O-ring female end on other side.

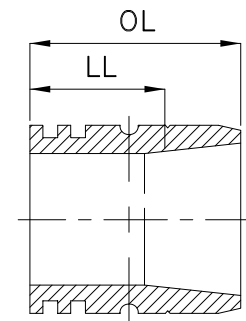
Nominal Pipe Size		Laying Length (LL)	Overall Length (OL)	O-ring Size	Key Size	Average Weight
[mm]	[inch]	[mm]	[mm]	[mm]	[mm]	[kg]
50	2	50	222	7 x 59.7	6 x 305	1.3
80	3	50	222	7 x 88.3	6 x 400	1.7
100	4	50	222	7 x 113.7	6 x 483	3.5
125	5	50	264	9 x 135	8 x 580	4.6
150	6	50	270	10 x 161.3	8 x 660	6.6
200	8	50	339	10 x 225.5	10 x 840	15.4
250	10	50	376	12.5 x 302	12 x 1270	19.9
300	12	50	478	12.5 x 342.3	15 x 1270	21
350	14	50	452	12.5 x 342.3	15 x 1360	25
400	16	50	496	12.5 x 393.1	18 x 1585	32
450	18	50	416	15.0 x 445.0	15 x 1750	27
500	20	50	433	15.0 x 490.0	15 x 1930	32
600	24	50	479	18.0 x 580.0	18 x 2240	52
700	28	50	560	20.0 x 685.0	20 x 2700	77
750	30	50	574	20.0 x 740.0	20 x 2700	90
800	32	50	644	20.0 x 790.0	20 x 3065	115
900	36	50	754	25.0 x 890.0	25 x 3175	170
1000	40	50	740	26.0 x 987.0	20 x 3500	208

## Key-Lock Adapter for Expansion Coupling

Filament-wound double O-ring male Key-Lock adapter with integral Quick-Lock (2-6 inch) or Taper/Taper (8-40 inch) socket end, for adhesive bonding.



Quick-Lock

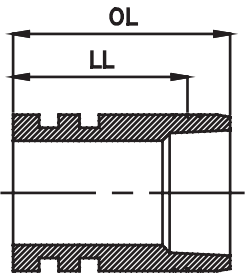


Taper/Taper

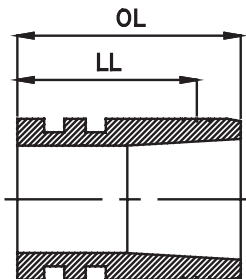
Nominal Pipe Size		Laying Length (LL)	Overall Length (OL)	Average Weight
[mm]	[inch]	[mm]	[mm]	[kg]
50	2	85	131	0.4
80	3	85	131	0.6
100	4	85	131	0.9
125	5	102	159	1.6
150	6	105	162	1.8
200	8	138	203	5.1
250	10	148	228	11.8
300	12	190	285	14.6
350	14	185	285	10.7
400	16	210	320	15.9
450	18	193	307	19.5
500	20	201	328	24
600	24	224	402	25
700	28	265	443	29
750	30	272	450	34
800	32	307	485	42
900	36	362	565	50
1000	40	355	765	64

## Double O-ring Adapter for Expansion Coupling

Filament-wound double O-ring male adapter with integral Quick-Lock (1-6 inch) and Taper (8-40 inch) socket end, for adhesive bonding.



Quick-Lock



Taper/Taper

Nominal Pipe Size		Laying Length (LL)	Overall Length (OL)	Average Weight
[mm]	[inch]	[mm]	[mm]	[kg]
50	2	85	131	0.4
80	3	85	131	0.7
100	4	85	131	0.9
125	5	102	159	1.6
150	6	105	162	1.8
200	8	138	203	5.1
250	10	148	228	11.8
300	12	190	285	14.6
350	14	185	285	10.7
400	16	210	320	15.9
450	18	193	307	19.5
500	20	201	328	24
600	24	224	402	25
700	28	265	443	29
750	30	272	450	34
800	32	307	485	42
900	36	362	565	50
1000	40	355	765	64

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**Adhesive**

Number of Adhesive Kits per joint.

Nominal Pipe Size		Adhesive Volume	Required Adhesive Kit Size	Minimum number of Adhesive Kits required per joint
[mm]	[inch]	[cm <sup>3</sup> ]	[Oz]	Number
25	1	88.7	3	1/5
40	1½	88.7	3	1/5
50	2	88.7	3	1/4
80	3	88.7	3	1/3
100	4	88.7	3	1/2
125	5	88.7	3	1
150	6	88.7	3	1
200	8	88.7	3	1
250	10	177.4	6	1
300	12	177.4	6	1
350	14	177.4	6	2
400	16	177.4	6	2
450	18	177.4	6	2
500	20	177.4	6	3
550	22	177.4	6	4
600	24	177.4	6	4
650	26	177.4	6	4
700	28	177.4	6	4
750	30	177.4	6	5
800	32	177.4	6	5
850	34	177.4	6	6
900	36	177.4	6	6
1000	40	177.4	6	7

## Notes:

1. Adhesive Kits should never be split. If remainder is not used for other joints made at the same time then surplus must be discarded.
2. Required adhesive for saddles is shown in the dimension table of the respective saddles.
3. For type of adhesive to be used, please refer to the Bondstrand Corrosion Guide.

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## Engineering Design & Installation

Consult the following literature for recommendations pertaining design, installation and installation use of Bondstrand pipe, fittings and flanges:

Assembly Instructions for Quick-Lock Adhesive-Bonded Joints  
Assembly Instructions for Taper/Taper Adhesive-Bonded Joints  
Assembly Instructions for Bondstrand Fiberglass Flanges  
Bondstrand Corrosion Guide for Fiberglass Pipe and Tubing  
Bondstrand Pipe Shaver Overview  
Bondstrand Marine Design Manual  
Bondstrand Heating Blanket

Please contact NOV Fiber Glass Systems or visit [www.fgepipe.com](http://www.fgepipe.com) (Document Library) for the latest version of the above-mentioned literature.

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## Specials

Note: Elbows with non-standard angles, non-standard drilled flanges, multi-branch tees and special spools are available on request, please consult NOV Fiber Glass Systems.

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## Field Testing

Pipe system is designed for hydrostatic testing with water at 150% of rated pressure.

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## Conversions

1 psi = 6895 Pa = 0.07031 kg/cm<sup>2</sup>  
1 bar = 105 Pa = 14.5 psi = 1.02 kg/cm<sup>2</sup>  
1 MPa = 1 N/mm<sup>2</sup> = 145 psi = 10.2 kg/cm<sup>2</sup>  
1 inch = 25.4 mm  
1 Btu.in/ft<sup>2</sup> h°F = 0.1442 W/mK  
°C = 5/9 (°F-32)

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The logo for NOV Fiber Glass Systems features the letters 'NOV' in a stylized, bold font with a red and blue circular graphic element to the left. To the right of 'NOV', the words 'Fiber Glass Systems' are written in a blue, sans-serif font.

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